

Studying primary school children's self-regulated learning

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Abstract

Notwithstanding the fact that self-regulated learning (SRL) is an important educational goal and the call for promoting SRL early in students' school careers, only little research has been conducted on primary school children's SRL. This empirical lack is related to the current need for valid measures of SRL regarding this age group. In order to gain more insight in primary school children's SRL, the present study focuses on the development and validation of a comprehensive self-report questionnaire. Based on the conceptual framework of Pintrich (2004), the Children's Perception of Self-Regulated Learning (CP-SRL) questionnaire, consisting of 9 subcomponents, was developed. After constructing the items for each subcomponent, the items were reviewed by a teacher and expert panel. Further, cognitive interviews were conducted to establish cognitive validity. The 109-item questionnaire was presented to 504 fifth and 463 sixth graders. After exploratory factor analyses on each subcomponent, the factor structure of each subcomponent was confirmed by confirmatory factor analyses. Further, internal consistency was computed. The results of these analyses indicate that the CP-SRL is an appropriate instrument for assessing SRL in late primary school children. As the instrument comprises several subcomponents, a differentiated view of children's SRL can be obtained. Therefore, the CP-SRL can be considered as a valuable tool to evaluate SRL interventions as well.

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Theoretical and empirical background

Although definitions of self-regulated learning (SRL) differ depending on researchers' orientations, there is agreement on Zimmerman's (1990) general conceptualisation that self-regulated learners are metacognitively, motivationally, and strategically active participants in their own learning (e.g., Boekaerts, 1999; Paris & Paris, 2001; Perry, Phillips, & Dowler, 2004; Pintrich, 2000; Winne & Perry, 2000). This description illustrates the multicomponent character of SRL. The metacognitive component refers to planning, setting goals, organising, self-monitoring, and self-evaluating during the learning process (e.g., Boekaerts, 1999; Pintrich, 2004). In terms of motivational processes, high self-efficacy, self-attributions, and intrinsic task interest are emphasised (e.g., Pintrich, 2004; Zimmerman, 2000). The strategic or cognitive component refers to students' learning strategies and tactics (e.g., Azevedo & Cromley, 2004; Boekaerts, 1999; Hadwin, Wozney, & Pontin, 2005; Winne, 2001) and to how they select, structure, and create environments optimising learning (Perry et al., 2004; Zimmerman, 1990). Further, models of SRL assume that SRL is a cyclical process proceeding from a preparatory or preliminary phase, through the actual performance or task completion phase, to an appraisal or adaptation phase (Puustinen & Pulkkinen, 2001). Research indicate that learners, who analyse task demands, set goals for their learning and then attempt to monitor and regulate their cognition, motivation, and behaviour experience more success in different learning situations (Zimmerman, 2002).

Consequently, SRL has become an important educational goal (Boekaerts, 1999). Nevertheless, a large number of learners encounter difficulties regulating their learning efficiently and effectively (Perry, Phillips & Dowler, 2004; Zimmerman, 2002). Therefore, Perry et al. (2004) highlight the importance of promoting SRL already in primary education, rather than waiting until the intermediate grades, when attitudes and actions associated with academically ineffective behaviours are well formed. Additionally, SRL becomes increasingly important in transition periods in which students switch from a more closely monitored environment, like primary education, to an environment in which greater independence and self-sufficiency outside the classroom is expected, like in secondary education (Cleary & Zimmerman, 2004; Dembo & Eaton, 2000; Wintgate, 2007). To meet these expectations, students need a repertoire of learning strategies and self-regulatory

strategies that they can access and utilise. These findings underline the importance to effectively promote SRL already in primary education. In order to foster SRL within this age group, it is however important to gain more insight into the self-regulatory processes late primary school children engage in. Following this view, the present study focuses on primary education, more specifically on fifth and sixth graders.

Even though recent research reveals that primary school children are capable of acquiring self-regulatory skills (Veenman, Van Hout-Wolters, & Afflerbach, 2006, Whitebread et al., 2009) and the call for promoting SRL early in students' school careers (Perry et al., 2004), only little research has been conducted on young children's SRL (Winne & Perry, 2000). This empirical lack is connected to the current need for valid measures of young children's SRL (Winne & Perry, 2000). Several methods have been used to measure SRL, including questionnaires, structured interviews, teacher ratings, observations, thinking aloud methods, error detection tasks, and trace methodologies (Winne & Perry, 2000). In order to enable large-scale research on primary school children's SRL, a comprehensive self-report instrument is wanting. Although there are several self-report questionnaires available to assess SRL in older students (e.g. LASSI, MSLQ), self-report questionnaires for measuring young children's SRL are scarce. Unlike most existing assessment methods restricting SRL to learning or metacognitive strategies, the self-report should comprise the different key components of SRL. In this respect, Pintrich (2004) has developed a conceptual framework to assess SRL. The model displays a framework for classifying the different phases and areas of regulation. The four phases are processes that many models of SRL share and they reflect goal setting and planning, monitoring, control and regulation, and reflection (Pintrich, 2004). These planning, monitoring, control, and regulation processes can be applied to four domains, namely cognition, motivation, behaviour, and context. In this way the framework reflects the phased structure of SRL processes and the multicomponent character of SRL.

Research goal

The aim of the present study is to develop and validate a comprehensive self-report questionnaire to gain insight in late primary school children's self-regulated learning in academic contexts.

Research method

Participants

504 fifth (52,1%) and 463 sixth graders (47,9%) from 43 Flemish (Belgium) primary schools participated. 501 girls (51,8%) and 466 boys (48,2%) aged 10 (0,4%), 11 (44,9%), 12 (47,4%), 13 (6,7%), and 14 (0,6%) participated.

Instrument

Item development. Based on the framework of Pintrich (2004), a self-report questionnaire was developed. Taken into account the fact that primary school children are the target group 9 subcomponents were selected guided by the current literature (see Table 1). For each subcomponent items were constructed based on current definitions and operationalisation in the literature and inspired by items of existing instruments. The items of the subcomponent 'motivation' was based on an adapted version of the academic self-regulation scale (Ryan & Connell, 1989), which has been successfully used in previous work (Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009). This resulted in an first item pool of 109 items.

Pilot testing. The items were reviewed by an expert panel ($N = 5$) to establish content validity and by a teacher panel ($N = 5$) to determine the suitability for primary education. Additionally, cognitive interviews with fifth and sixth graders ($N = 15$) were performed to examine whether respondents' interpretations of self-report items are consistent with researchers' assumptions and intended meanings given the constructs the items are designed to measure (Karabenick et al., 2007). During the cognitive interview the participants were asked to: (a) read the question aloud; (b) explain or paraphrase the question; (c) choose an answer; and (d) explain why he or she chose that answer (Karabenick et al., 2007).

Based on the panel findings and cognitive interviews, the items were refined. The review process resulted in an item bank of 109 items which were scored on a 5-point Likert scale.

Data Analysis

First, exploratory factor analyses (EFA) (maximum likelihood with promax rotation) were carried out to investigate the underlying structure of the items of each subcomponent.

In order to determine the number of factors to retain, parallel analysis in R was used with the 95th percentile as the comparison baseline, and the number of random data sets was 10,000 (Henson & Roberts, 2006; Pohlmann, 2004). Second, confirmatory factor analyses (CFA) were conducted on each subcomponent examining the stability of the exploratory factor structure. In order to evaluate the model fit, several fit indices were calculated: (a) the χ^2 and p -value, (b) the root mean square error of approximation (RMSEA), (c) the standardized root mean square residual (SRMR), (d) the comparative fit index (CFI), and (e) the Tucker-Lewis index (TLI). For RMSEA, a cutoff value close to .06 is required for a relatively good fit (Hu & Bentler, 1999), a value lower than .08 indicates a reasonable model fit (Schreiber, Nora, Stage, Barlow, & King, 2006). Furthermore, Hu and Bentler (1999) stated that a value of SRMR of 0.08 or lower indicates a good fit. In addition, CFI and TLI should be above .90 to indicate an adequate fit (Brown & Cudeck, 1993).

Table 1

Relationship between selected subcomponents and the structure and concepts of the model of Pintrich (2004, p. 390)

Subcomponent	Description	Phase	Area of regulation ^a	Related concepts of Pintrichs Model	Example item
Task analysis	<ul style="list-style-type: none"> Analysing task demands Activation prior (content/metacognitive) knowledge Perceptions of task (task difficulty, interest) 	Forethought, goal & activation	Cognition Motivation/affect	Prior content knowledge activation Metacognitive knowledge activation EOL, perceptions of task difficulty Interest activation	Before I start my schoolwork, I carefully read the instructions.
Planning	<ul style="list-style-type: none"> Goal setting Time planning Strategic planning 	Forethought, goal & activation	Cognition Behaviour	Target goal setting Time and effort planning	Before I start my schoolwork, I think of several ways to approach the task and choose the best one.
Motivation	<ul style="list-style-type: none"> External regulation Introjected regulation Identified regulation Intrinsic regulation 	Forethought, goal & activation	Motivation/affect	Goal orientation adoption	I want to do well in school, because I want others to think I'm smart.
Self-efficacy	<ul style="list-style-type: none"> Judgments of competence to regulate their learning 	Forethought, goal & activation	Motivation/affect	Efficacy judgments	I'm confident I can motivate myself to finish my schoolwork.
Monitoring	<ul style="list-style-type: none"> Awareness and monitoring of cognition, motivation, and effort 	Monitoring	Cognition Motivation Behaviour	Awareness and monitoring of cognition, motivation, and effort	During my schoolwork, I ask myself: 'Do I understand everything?'

Learning strategies	<ul style="list-style-type: none"> • Rehearsal strategies • Elaboration strategies • Organisational strategies 	Control	Cognition	Selection and adaptation of cognitive strategies for learning, thinking	When I study, I underline the most important parts.
Motivational strategies	<ul style="list-style-type: none"> • Self-reinforcement • Positive self-talk • Interest enhancement 	Control	Motivation/affect	Selection and adaptation of strategies for managing motivation and affect	During my schoolwork, I say to myself: 'You can do it, just keep working!'
Persistence	<ul style="list-style-type: none"> • Persistence • Concentration 	Control	Behaviour	Increase/decrease effort Persist, give up	Even if I would like to do other interesting things, I first finish my schoolwork.
Self-evaluation	<ul style="list-style-type: none"> • Evaluation of the performance • Evaluation of the learning process • Affective reactions 	Reflection	Cognition Motivation Behaviour	Cognitive judgments Affective reactions	After I finish my schoolwork, I review my answers.

Note: ^a As the CP-SRL is a general and not a task-specific self-report questionnaire, the domain 'context' is not incorporated. Moreover, Pintrich (2000) acknowledge that control of tasks or context may be more difficult because they are not always under direct control of the learner in comparison to control and regulation of cognition, motivation, and behaviour.

Results and discussion

Regarding 5 subcomponents, both the parallel analysis and EFA suggest a one-factor model: 'task analysis', 'planning', 'monitoring', 'persistence', and 'motivational strategies'. With regard to the subcomponents 'self-efficacy', 'learning strategies', and 'self-evaluation' the analyses show a two factor solution. The first factor of the 'self-efficacy' subcomponent could be interpreted as 'self-efficacy regarding regulation', while items loading high on the second factor could be labelled as 'self-efficacy regarding motivation'. Factor one of 'learning strategies' consisted of items corresponding to organisational and elaboration strategies. Therefore, this factor was labelled as 'deep-level strategies'. The other factor of the subcomponent 'learning strategies' contained items referring to rehearsal strategies and was labelled as 'superficial strategies'. The first factor of the subcomponent 'self-evaluation' was labelled 'proces' and refers to the evaluation of learning processes. The other factor of 'self-evaluation' reflects the evaluation of the performance, labelled as 'product'. In line with self-determination theory (Deci & Ryan, 2000) and based on the parallel analysis four factors were retained for the 'motivation' subcomponent and were labelled as 'extrinsic regulation', 'introjected regulation', 'identified regulation', and 'intrinsic motivation'. Table 2 presents the results of the CFA, reliability analyses, and descriptive statistics. The CFA's show a moderate to good fit and the internal consistency was satisfying. The final version of the questionnaire comprises 80 items.

Although further research is required, the results indicate that the Children's Perceptions of Self-Regulated Learning (CP-SRL) questionnaire can serve as a valuable tool to assess SRL in late primary school children. In this respect, the development of the CP-SRL is of theoretical and empirical importance, since instruments measuring children's SRL are scarce. As the questionnaire comprises several subcomponents, it allows teachers and researchers to obtain a differentiated view of children's self-regulatory abilities. Therefore, it is also a valuable tool to evaluate SRL interventions. Additionally, it provides possibilities to explore the interrelationships among the self-regulatory subcomponents, leading to further theory development and testing.

As the literature points at the importance of a multi-method approach to measure SRL (van Hout-Wolters, 2009), a combination of the present CP-SRL with concurrent methods (e.g. think aloud measures and trace methodologies) is advisable in order to paint a full portrait of children's' SRL (e.g., Boekaerts & Corno, 2005; Winne, 2005).

Table 2

Results of CFA, reliability coefficients and descriptive statistics

	SB X^2	df	p	RMSEA	SRMR	CFI	TLI	α	N _{items}	M (SD)
1. Task analysis	25.188	9	0.003	0.044	0.031	0.971	0.952	.65	6	3.39 (0.70)
2. Planning	76.820	9	0.000	0.089	0.050	0.885	0.809	.66	6	3.33 (0.70)
3. Motivation	260.355	82	0.000	0.048	0.047	0.963	0.952			
External								.80	3	2.66 (1.07)
Introjected								.74	4	3.37 (0.94)
Identified								.81	4	4.20 (0.77)
Intrinsic								.88	4	3.31 (1.04)
4. Self-efficacy	241.106	63	0.000	0.055	0.046	0.927	0.909			
Regulation								.79	9	3.47 (0.67)
Motivation								.81	4	3.85 (0.83)
5. Learning strategies	236.553	76	0.000	0.047	0.046	0.924	.909			
Deep-level								.78	10	3.27 (0.65)
Superficial								.71	4	3.78 (0.77)
6. Motivational strategies	85.418	9	0.000	0.094	0.053	0.905	0.842	.71	6	3.60 (0.73)
7. Monitoring	43.066	14	0.000	0.047	0.037	0.965	0.947	.71	7	3.49 (0.69)
8. Persistence	32.063	8	0.000	0.056	0.025	0.982	0.965	.84	6	3.98 (0.72)
9. Self-evaluation	43.580	13	0.000	0.050	0.033	0.979	0.966			
Proces								.75	4	2.95 (0.94)
Product								.73	3	3.86 (0.81)

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